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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/896,836

07/02/2001

Hans Leysieffer

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03/17/2006

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EXAMINER

HARPER, V PAUL

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/896,836	Applicant(s) LEYSIEFFER ET AL.	
	Examiner V. Paul Harper	Art Unit 2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-20 and 68-76 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-20 and 68-76 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4, 6, 7, 9, 10, 13, 14, 17, 19, 20, 71-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels et al. (US Patent 6,047,074), hereinafter referred to as Zoels, in view of von Ilberg (U.S. Patent 6,231,604), hereinafter referred to as von Ilberg in view of Leonhard (U.S. Patent 5,884,260), hereinafter referred to as Leonhard, and Boss et al. (U.S. Patent 5,933,805), hereinafter referred to as Boss.

Regarding **claim 1**, Zoels discloses a programmable hearing aid, which includes the following features:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1 items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal (Fig. 1, item 7, col. 2, lines 1-6),

Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 9-11), but Zoels does not specifically disclose "an actuator arrangement configured to provide output stimulation and configured for positioning in a single external auditory passage; said actuator comprising at least dual output stimulators, wherein said output stimulators are at least one extracochlear electroacoustic, electromechanical, or purely electric stimulator, and at least an additional electroacoustic, electromechanical, or purely electric stimulator." However, the examiner contends that this concept was well known in the art, as taught by von Ilberg

In the same field of endeavor, von Ilberg discloses a method for combined acoustic mechanical and electrical auditory stimulation that includes 1 or 2 electrodes for extra-cochlear placement (Fig. 1, item 17, col. 5, lines 33-37, col. 1, lines 57-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing the transducer configuration, as taught by von Ilberg, because it is well known in the art at the time of invention as having advantages for patients who are moderately hearing impaired (col. 3, lines 25-40).

In addition, Zoels' invention includes a programmable processor, but Zoels does not specifically disclose, "said signal processing unit including, a speech analysis and recognition module, a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment." However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does specifically teach "said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information, and ... wherein said speech synthesis module is arranged to take into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, since it is well known in the art for the

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purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 2**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the signal processing unit has a digital signal processor having software modules for speech analysis and synthesis." However, the examiner contends that these concepts were well known in the art, as taught by Leonhard.

Leonhard's system further performs signal analysis and synthesis within a signal processor (Figs. 8, 19, abstract, col. 1, lines 5-20, col. 15, lines 49-54), the processor necessarily containing software modules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing algorithmic features, as taught by Leonhard, for the purpose adhering to standard modular software design practices.

Regarding **claim 3**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible adaptability by replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence

replaceable), which corresponds to “the speech analysis and speech recognition module and the speech synthesis module are adaptive.”

Regarding **claim 4**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable or re-programmable), which corresponds to “the speech analysis and speech recognition module and the speech synthesis module are re-programmable.

Regarding **claim 6**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach “the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit phonetic categories between said modules.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, signal corresponding to phonemes are used (col. 11, lines 1-9, col. 13, lines 14-26, col. 15, lines 17-24, Figs. 8 and 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

using signal representing phonemes, as taught by Leonhard, since phonetic representation can be used during both recognition and synthesis.

Regarding **claim 7**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit lexical categories between said modules." However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, a word/sentence determination can be made (col. 13, lines 14-26, Fig. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the use of lexical categories, as taught by Leonhard, since lexical categories can improve accuracy during recognition and can also be useful during synthesis.

Regarding **claim 9**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "said arrangement is configured to detect and extract prosody of speech information is adapted for extraction of level and characteristic of fundamental speech frequency for voiced sounds, and the arrangement configured to take into account prosody of speech information in speech synthesis is adapted to effect the

corresponding modulation of the output signal.” However, the examiner contends that this concept was well known in the art, as taught by Boss.

Boss further teaches that during the extraction of the prosodic features, pitch (fundamental frequency), duration and amplitude (level) are detected and that these parameters are encoded and used during synthesis (Fig. 4 items 56, 58, and 60; col. 3, lines 5-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, to more accurately reproduce the prosodic features of the analyzed speech.

Regarding **claim 10**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches that the signal processing (used in Zoels specifically for tinnitus treatment, and in Zoels in view of Leonhard for analysis and synthesis) can be enabled and disabled (col. 5, lines 19-44), which corresponds to “the speech analysis and recognition module and the speech synthesis module are adapted to be turned off to enable processing of audio signals without speech analysis and synthesis.”

Regarding **claim 13**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). Furthermore, Zoels teaches that the hearing aid system can be used for tinnitus therapy (i.e., programmed for the

masking of the tinnitus) (col. 1, line 64 through col. 2, line 55), which corresponds to “the signal processing unit further includes modules adapted to enable masking of tinnitus parallel to operation of the hearing aid.”

Regarding **claim 14**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an amplifier and a signal converter (necessarily including an A/D converter) before the signal processor (Fig. 1 items 6, 4), which corresponds to “the signal processing unit includes, a preprocessing arrangement for at least one of pre-amplification and filtering, and an A/D converter for analog-digital (A/D) conversion of the acoustic signals.”

Regarding **claim 17**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1); in addition, Zoels teaches the use of a signal converter (necessarily including a D/A converter) feeding an output transducer (Fig. 1, col. 2, lines 1-10), which corresponds to “at least one digital-analog converter is connected upstream of the actuator arrangement.”

Regarding **claims 19 and 20**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 17); furthermore, Zoels teaches the use of a digital hearing aid (with a signal converter and a signal processor) that can be employed for tinnitus masking (abstract, col. 2, lines 1-35), which corresponds to “the signal processing unit further comprises a digital signal processor configured to process

A/D-converted acoustic sensor signals, wherein said signals have been preprocessed by means of said preprocessing arrangement and configured to generate digital signals for tinnitus masking.”

Regarding **claim 71**, Zoels discloses a programmable hearing aid, which includes the following features:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1 items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal I (Fig. 1, item 7, col. 2, lines 1-6),

Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 9-11), but Zoels does not specifically disclose “an actuator arrangement configured for positioning in a single external auditory passage; said actuator arrangement comprising at least dual output stimulators, wherein said output stimulators are at least one extracochlear electroacoustic, electromechanical, or purely electric stimulator, and at least an additional electroacoustic, electromechanical, or purely electric stimulator.” However, the examiner contends that this concept was well known in the art, as taught by von Ilberg

In the same field of endeavor, von Ilberg discloses a method for combined acoustic mechanical and electrical auditory stimulation that includes 1 or 2 electrodes for extra-cochlear placement (Fig. 1, item 17, col. 5, lines 33-37, col. 1, lines 57-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing the transducer configuration, as taught by von Ilberg, because it is well known in the art at the time of invention as having advantages for patients who are moderately hearing impaired (col. 3, lines 25-40)

In addition, Zoels' invention includes a programmable processor, but Zoels does not specifically disclose, "said signal processing unit including, a speech analysis and recognition module, configured to facilitate the transmission of speech information in a noisy environment." However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does specifically teach "a speech synthesis module arranged to take into account the prosody of speech information in speech synthesis."

However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, since it is well known in the art for the purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 72**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, von Ilberg teaches "wherein said additional stimulator comprises an intracochlear output stimulator (col. 4, line 67 through col. 5, line 3).

Regarding **claim 73**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 72). In addition, von Ilberg teaches "said additional intracochlear output stimulator comprises an electromechanical converter for excitation of the fluid-filled innerear spaces" (col. 1, lines 57-67; col. 2, lines 46-49; col. 5, lines 44-48 with necessary excitation of fluid-filled innerear spaces).

Regarding **claim 74**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 72). In addition, von Ilberg teaches “said additional intracochlear output stimulator comprises a purely electrical electrode array” (col. 2, lines 44-48, multichannel array electrodes may be ...).

Regarding **claim 75**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, von Ilberg teaches “said at least dual output stimulators comprise: an extracochlear multichannel array of electromechanical converters for stimulation of the middle ear, and an intracochlear electrically acting stimulation electrode array, having at least one stimulation electrode for electrical stimulation of the inner ear” (col. 2, lines 7-22; lines 37-51, multichannel array may be partially or fully inserted ...; col. 5, lines 25-37).

Regarding **claim 76**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 71). In addition, Zoels teaches “said extracochlear output stimulator comprises an electroacoustic stimulator” (col. 1, lines 9-11; and von Ilberg teaches [col. 5, lines 25-30] an acoustic mechanical component similar to that found in prior art hearing aids).

2. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 1 above, and further in view

of Markowitz (*Using Speech Recognition*, Prentice Hall, 1996), hereinafter referred to as Markowitz.

Regarding **claim 5**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the speech analysis and speech recognition module and the speech synthesis module include a digitally implemented neural network." However, the examiner contends that this concept was well known in the art, as taught by Markowitz.

In the same field of endeavor, Markowitz teaches the techniques for using and implementing speech recognition. In addition, Markowitz teaches the use of neural networks for speech recognition (p. 44, §2.5.1 "Neural Networks for Speech Recognition," p. 46, §2.5.7 "Neural Networks for Speech Coding").

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the neural network techniques for speech recognition, as taught by Markowitz, for the superior classification techniques resulting from the use of neural networks.

3. Claims 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 10 above, and further in view of well known prior art (MPEP 2144.03).

Regarding **claim 11**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches an automatic change in the control elements (in this case, a change in the generated signals for tinnitus therapy) (col. 5, lines 20-44), which corresponds to “configured to automatically turn off the speech analysis and recognition module and the speech synthesis module [signal processing modules] ...”. But Zoels in view of Leonhard does not teach that the switching occurs “at a low level of interfering sound.” However, the examiner takes official notice of the fact that the automatic switching of noise-reducing signal processing software was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that automatic switching could be used, making the operation of the unit more convenient for the user.

Regarding **claim 12**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches that the signal processing can be controlled by a control element (Fig. 4 item 17, col. 5, lines 20-44), which corresponds to “configured to turn off the speech analysis and recognition module and the speech synthesis module ...”. But Zoels in view of Leonhard do not specifically teach that the means is “...by remote control.” However, the examiner takes official notice of the fact that the use of a remote control for the purpose of controlling the operation of a hearing aid was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that a remote control could be used, making the operation of the unit more convenient for the user.

Regarding **claim 15**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 14), including the use of a signal converter (Zoels, Fig. 1 item 14), but Zoels in view of Leonhard do not specifically teach “the preprocessing arrangement comprises an anti-aliasing filter.” However, the examiner takes official notice of the fact that the use of an anti-aliasing filter before an analog to digital conversion for the purpose of reducing aliasing was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard to include an anti-aliasing filter, to improve the quality of the signal processing.

4. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of von Ilberg, Leonhard and Boss as applied to claim 1 above, and further in view of Magotra et al. (US Patent 5,608,803), hereinafter referred to as Magotra.

Regarding **claim 16**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use

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of a microphone connected to a signal converter (Fig. 1, items 6, 4), but Zoels in view of Leonhard do not specifically teach, "a plurality of acoustic sensors, wherein said acoustic sensors are configured to be upstream of an analog-digital converter." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where the outputs of two microphones are feed into A/D converters (Fig. 1, items 10, 1, col. 3, Ins 35-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic inputs, as taught by Magotra, for the purpose of improved filtering capabilities.

Regarding **claim 18**, Zoels in view of von Ilberg, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an output transducer connected to a signal converter (Fig. 1, items 5, 4), but Zoels in view of Leonhard do not specifically teach that "the actuator arrangement comprises a plurality of actuators, and wherein a respective digital-analog converter is connected upstream of each actuator." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where stereo outputs feed earphones (Fig. 1, items 8, 11, 13; col. 3, lines 40-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic outputs, as taught by Magotra, so that stereo output can be supported.

5. Claims 68-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and Boss.

Regarding **claim 68**, Zoels discloses a programmable hearing aid, which includes the following:

- at least one acoustic sensor, configured to sense an acoustic signal and configured to convert said acoustic signal into an electrical audio signal (Fig. 1, items 2 and 4, col. 2, lines 1-6),
- an electronic signal processing unit configured to process and amplify said electrical audio signal, said signal processing unit including (Fig. 1, item 7, col. 2, lines 1-6),
- an actuator arrangement configured to provide output stimulation (Fig. 1, item 5).

In addition, Zoels' invention includes a programmable processor (Fig. 1), but Zoels does not specifically teach "a speech analysis and recognition module, wherein said speech analysis and recognition module are configured to perform at least one of speech information segmentation or recognition, ..." However, the examiner contends that these features were well known in the art as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels does not specifically teach "...said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information, and a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment, wherein said speech synthesis module is arranged to take into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically

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providing the features, as taught by Boss, since it is well known in the art for the purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 69**, Zoels in view of Leonhard and Boss teach everything claimed, as applied above (see claim 68). Furthermore, Boss teaches "said signal processor is configured to output a purely artificial speech signal" (Boss, col. 3, lines 30-37, synthesizer selects digitized patterns in the dictionary ...)

Regarding **claim 70**, Zoels in view of Leonhard and Boss teaches everything claimed, as applied above (see claim 69). Furthermore, Leonhard teaches "said signal processor is configured to effectively eliminate inputside interference portions" (col. 15, lines 30-33, improve noise suppression in speech signals).

Response to Arguments

6. Applicants' arguments filed 1/30/2006 have been fully considered but are either not persuasive or moot in view of new art.

7. Applicant asserts on page 9:

2. By the foregoing Amendments, Applicant has amended the claims to make the claims more readable. Applicant submits that the above Amendments do not narrow the scope of the claims and have not been made to overcome or accommodate any objection or rejection. Applicant further submits that no new matter has been added.

It is noted that claim 1 was amended to replace the phrase "at least one output actuator" with the phrase "comprising at least dual output stimulators" which changed the scope of the claim.

8. Applicant asserts on page 12:

14. Furthermore, the Examiner's assertion that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated" is equally unconvincing. (See, Office Action, page 4.) There is no motivation in the art of record to combine the noise suppression features of Leonhard the system of Zoels because Zoels teaches away from the principles of noise reduction. (See, Zoels, cal. 2, Ins. 35-54.) As noted above, Zoels is directed to a hearing aid system that generates "tinnitus therapy signals with the signal processor" to mask tinnitus. (See, Zoels, cal. 2, Ins. 1-35.) Zoels accomplishes this masking by creating broadband and narrowband noise. (See, Zoels, cal. 2, Ins. 35-54.) Thus, because the system of Zoels necessarily operates in a system created noisy environment, there is no need to combine the noise suppression techniques of Leonhard with Zoels.

Zoels teaches that the hearing aid allows a number of different functions or modes (tinnitus master, ... or hearing aid) (col. 3, lines 8-10) and that one of the functions of a hearing aid is to reduce unwanted noises (col. 4, lines 35-39).

Furthermore, in the tinnitus mode a narrowband noise can be used (col. 2, lines 40-47) where it would be reasonable to assume that a reduction of unwanted noise in the bandwidth not covered by the narrowband noise would benefit the quality of the speech signal generated. Thus the teachings of Leonhard regarding noise reduction would improve the quality of the speech generated by Zoels device.

9. Applicant asserts on page 12:

15. Also, Zoels notes "[a] person with normal hearing can employ the digital hearing aid as a communication device that ... reduces the unwanted noises present in the useful signal." (See, Zoels, cal. 4, Ins. 33-38.) Thus, because Zoels already contains a means of reducing noise in the system, there is no need to incorporate the noise reduction means of Leonhard. Therefore, for at least these reasons, Applicants assert that the rejection under section 103 was improper and should be withdrawn.

Leonhard discloses the details of an improved technique for reducing noise and improving speech quality indicating that this technique can be use with hearing aids (col. 1, lines 5-15; col. 15, lines 30-32). While Zoels indicates the benefit of noise reduction (as stated by the Applicant above) Zoels does not go into the specifics of any noise reduction algorithms which are further discussed by Leonhard.

10. Applicant asserts on page 13:

17. There is no suggestion in the art of record that there is a need to incorporate the use of prosodic parameters into Leonhard and Zoels because, as noted by the Examiner, Zoels discloses a system that "performs signal analysis, recognition and synthesis." (See, Office Action, page 4; Leonhard col. 2, Ins. 56-60.) Therefore, because Leonhard has means to "obtain distinct features within auditory signals by examining the transformed low frequency signals," there is no need to incorporate the prosodic extraction and use means disclosed in Boss to improve the quality of the sound. Therefore, for at least this reason Applicants assert that the rejection under section 103 was improper and should be withdrawn.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

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references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Boss discloses a system for speech analysis that retains the prosodic features of the speech for use during subsequent synthesis (abstract, Fig. 4), where Quagliaro supplies the motivation to combine by teaching the particular need for hearing-impaired individuals to have prosodic information during synthesis (Quagliaro, col. 3, lines 1-15).

11. Applicant asserts on page 13:

The Proposed Combination Lacks Elements of Applicants' Claim 1
18. For reasons noted above, the Examiner has used impermissible hindsight to explain why one of ordinary skill in the art would be motivated to modify Zoels in view of Tibbetts, in further view of Leonhard and Boss. Furthermore, even if the references were combined as suggested by the Examiner, the resulting combination would not contain all elements of the claimed invention.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). See previous arguments. The examiner also notes that in the combinations used in the rejection of claim 1, references were used to support the motivations.

12. Applicant asserts beginning on page 13:

19. In the rejection under 35 U.S.C. 103(a) the Examiner states that Zoels teaches an "an actuator arrangement configured to provide output stimulation and ...comprising at least dual output stimulators, wherein said output stimulators are at least one extracochlear electroacoustic, electromechanical, or purely electric stimulator, and at least an additional electroacoustic, electromechanical, or purely electric stimulator." (See, Applicants' claim 1, above; Office Action, page 3.) However, Zoels is directed to purely electroacoustic stimulation. In fact, Zoels completely fails to teach or suggest any type of output stimulation that it is not purely electroacoustic. (See, Zoels, claims, col. 2, Ins. 1-35.) Similarly, neither Tibbetts nor the other art of record teach or suggest "an actuator arrangement configured to provide output stimulation by any combination of electroacoustic, electromechanical, or purely electric stimulation based on the electrical audio signal processed in said electronic signal processing unit" as recited in Applicants' claim 1. In fact, only Tibbetts is directed towards electroacoustic output stimulation while the remaining art of record fails to disclose any type of output stimulation. Therefore, Applicants respectfully submit that the combination proposed by the Examiner was improper for at least the reason that the combination fails to teach or suggest the above recited element of Applicants' claim 1. Thus, Applicants respectfully submit that the rejection under section 103 was improper and should be withdrawn.

The examiner notes that the phrase "comprising at least dual output stimulators" was introduced in the current amendments and that the listing of output stimulators is given in the alternative where Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 10-11).

13. Applicant asserts on page 14:

20. Furthermore, as noted above, the Examiner acknowledges that Zoels fails to teach or suggest Applicants' claim 1 because Zoels does not disclose "an electronic signal processing unit configured to process and amplify said electrical audio signal, ... and a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment." (See, Applicants' claim 1, above; Office Action, page 4.) However, the Examiner's assertion that "these features were well known

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in the art, as taught by Leonhard" is incorrect. (See, Office Action, page 4.) It was improper for the Examiner to rely upon Leonhard to teach this element of Applicants' claim 1 because, also as acknowledged by the Examiner, the processor disclosed in Leonhard fails to teach or suggest a processor "wherein said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information, and ... wherein said speech synthesis module is arranged to take into account the prosody of speech information in speech synthesis." (See, Applicants' claim 1, above.)

Zoels discloses the use of a programmable hearing aid with a signal processor (col. 1, lines 6-11). Leonhard discloses analysis, recognition and synthesis techniques for processing speech in a noisy environment based on phoneme recognition (abstract, Fig. 8, col. 1, lines 5-20, also used with hearing aids). And Boss teaches the recognition of phonemes and prosodic information and the subsequent use of the prosodic information during synthesis (abstract, Fig. 4, col. 3, lines 1-37, prosodic parameters are applied during synthesis). Thus the combination of Zoels in view of Leonhard and Boss teaches the above limitations.

14. Applicant asserts on page 14:

21. As evidence that Leonhard does not teach the claimed element recited above, Applicants point to the fact that Examiner relied upon another reference, Boss, to disclose the use of prosodic information in signal processing. (See, Office Action, page 4; Boss, Abstract, col. 3, lines 1-19.) Therefore, Applicants submit that Leonhard does not disclose "an electronic signal processing unit configured to process and amplify said electrical audio signal, ... and a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment" and these elements are not "well known in the art," as asserted by the Examiner. (See, Office Action, page 4.) Therefore, for at least this reason, Applicants submit that the rejection under section 103 was improper and should be withdrawn.

Leonhard teaches "an electronic signal processing unit configured to process and amplify said electrical audio signal, ... and a speech synthesis module configured to facilitate the transmission of speech information in a noisy environment" (Fig. 8, item 16, analysis, recognition; abstract, a method of speech synthesis; col. 15, lines 30-33, used in hearing aids in order to improve noise suppression in speech signals), and Boss further teaches the use of prosodic information (col. 1, lines 16-21). The combination of Zoels in view of Leonhard and Boss teaches the claimed limitations.

15. Applicant asserts on page 15:

22. Furthermore, Boss or the other art of record fail to teach or suggest that which is missing from Zoels and Leonhard. In Boss, a "speech analyzer identifies each of the speech of the speech segments in the received digitalized speech signal... [and] speech analyzer outputs each of the digitalized speech segments." (See, Boss, col. 3, Ins. 2-6.) "A plurality of prosodic parameter detectors, including a pitch detector, a duration detector, and an amplitude detector, are each coupled to memory and speech analyzer." (See, Boss, col. 4, Ins. 1-13.) Thus, Boss discloses a system that uses a separate speech analyzer and prosodic parameter detectors that are completely separate from the speech analyzer. However, Applicants' claim 1 recites, in part, "a speech analysis and recognition module, wherein said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information." *Thus, because Boss fails to teach or suggest a single module "arranged to detect and extract additional prosody of the speech information," as recited in Applicants' claim 1, Boss fails to teaches or suggest that which the Examiner asserts. Therefore, because the art of record fails to teach or suggest all elements of the claimed invention, Applicants assert for at least this reason the rejection under section 103 was improper and should be withdrawn. (Italics added)*

The examiner notes that Zoels in view of Leonhard and Boss teach the functionality as claimed (see previous arguments and rejections). Furthermore, the

claim language itself suggests multiple modules (or multiple functions) : “wherein said speech analysis and recognition module are arranged to detect and extract additional prosody of the speech information.” How are the speech and recognition module(s) arranged to detect and extract additional prosody and speech information? One possibility is that they are coupled to other modules for the extraction of prosodics (note: Boss teaches that a “plurality of prosodic parameter detectors ... are each coupled to ...[the] speech analyzer for detecting various prosodic parameters ...” [col. 4, lines 2-7]).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is (571) 272-7605. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

3/9/2006

V. Paul Harper
Patent Examiner
Art Unit 2654

A handwritten signature in black ink, appearing to read "V. Paul Harper", is written over a light gray, wavy signature line.